

**DATA VALIDATION REPORT  
2011 REMEDIAL INVESTIGATION/FEASIBILITY STUDY  
OFF PROPERTY SOILS  
OPERABLE UNIT 1  
JUNE 2011  
SOIL SAMPLING EVENT**

**OLIN CHEMICAL SUPERFUND SITE  
51 EAMES STREET  
WILMINGTON, MASSACHUSETTS**

*Prepared for:*



**Olin Corporation  
3855 North Ocoee Street, Suite 200  
Cleveland, TN 37312**

*Prepared by:*



**AMEC Environment & Infrastructure  
107 Audubon Road, Suite 301  
Wakefield, Massachusetts 01880**

**October 20, 2011**

**AMEC Project No. 6107110016/12**

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A handwritten signature in blue ink, appearing to read "P. H. Thompson".

Peter H. Thompson  
Project Manager

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Michael J. Murphy  
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## ACRONYMS AND ABBREVIATION

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APHA	American Public Health Association
CCVRRF	Continuing Calibration Verification Relative Response Factor
CCV%D	Continuing Calibration Verification Percent Difference
CLP	Contract Laboratory Program
DMF	N, N-Dimethylformamide
DPA	Diphenylamine
EDD	Electronic Data Deliverable
FD	Field Duplicate
HPLC	High Performance Liquid Chromatography
HT	Holding Time
ICP	Inductively Coupled Plasma
ICSA	Interference Check Sample Mix A
ICV	Initial Calibration Verification
ICVRRF	Initial Calibration Verification Relative Response Factor
J	estimated value
-L	low bias
LCS	Laboratory Control Sample
MACTEC	MACTEC Engineering and Consulting, Inc.
MassDEP	Massachusetts Department of Environmental Protection
MCP	Massachusetts Contingency Plan
MDL	Method Detection Limit
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MMH	Monomethylhydrazine
MS/MSD	Matrix Spikes/Matrix Spike Duplicate
NDMA	N-nitrosodimethylamine
PE	Performance Evaluation
QAPP	Quality Assurance Project Plan
QC	Quality Control

RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative Percent Difference
RRF	Relative Response Factor
SDG	Sample Delivery Group
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TIC	Tentatively Identified Compound
U	non-detect
UDMH	Unsymmetrical Dimethylhydrazine
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

## 1.0 INTRODUCTION

Surface soil samples were collected at the Olin Chemical Superfund Site on June 8, 2011 as specified in the Remedial Investigation/Feasibility Study (RI/FS) Work Plan (MACTEC Engineering and Consulting, Inc. [MACTEC], 2009). Samples were analyzed by one or more of the following: United States Environmental Protection Agency (USEPA) SW-846 (USEPA, 1996a), USEPA wastewater (USEPA, 1993), Standard Methods American Public Health Association ([APHA], 1995), or laboratory developed methods:

Laboratory	Parameter	Analytical Method	Validation Level
TestAmerica - Westfield, MA	VOCs	SW-846 8260C	Tier II
TestAmerica - Westfield, MA	SVOCs	SW-846 8270D – Low Level	Tier II
TestAmerica - Westfield, MA	Diphenylamine (DPA)	SW-846 8270D – Low Level	Tier II
TestAmerica - Westfield, MA	N-nitrosodimethylamine (NDMA)	SW-846 8270D – Low Level	Tier II
TestAmerica - Westfield, MA	TAL Metals	SW-846 6010B/Hg by 7470A	Tier II
TestAmerica - Irvine, CA	TAL Metals	SW-846 6020	Tier II
TestAmerica - Westfield, MA	Ammonia	QuikChem: LACHAT 10-107-06-1-B	Olin Level 1
TestAmerica - Westfield, MA	Anions (chloride, sulfate, nitrate, nitrite)	EPA 300	Olin Level 1
TestAmerica - Westfield, MA	Percent solids/percent moisture	EPA 160.3	Chemist Review
TestAmerica - Tallahassee, FL	Formaldehyde/Acetaldehyde	SW-846 8315A	Chemist Review
TestAmerica - Tallahassee, FL	Phthalic Anhydride	Modified Method 8000 – LC	Chemist Review
Lancaster Laboratory - Lancaster, PA	Hydrazine/MMH/UDMH	Modified 8315 LC/MS/MS	Chemist Review
Katahdin Analytical Services - Scarborough, ME	N, N-dimethylformamide (DMF)	Modified 8033 - GC/NPD	Chemist Review

A summary of samples (by sample delivery group [SDG]) included in this data validation report is presented in Table 1. Analytical data packages were reviewed in accordance with the Olin Chemical Superfund Site Final RI/FS Work Plan Quality Assurance Project Plan (QAPP) [MACTEC, 2009]. Volatile organic compounds (VOCs), semivolatile organic compounds

(SVOC), and metals data were validated using the Region I EPA-New England Data Validation Functional Guidelines (USEPA, 1996b) and the Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP) (Massachusetts Department of Environmental Protection [MassDEP], 2004). USEPA Region I data validation procedures for SW-846 Methods were modified to include method-specific criteria (i.e., measurement performance criteria detailed in the QAPP) from the MCP Methods. For other methods that were not addressed in USEPA Region I guidelines or the MCP Compendium, method performance criteria were developed for this project. Validation levels for each method reviewed (Tier II, Olin Level 1, chemist review) are summarized above.

Final, validated sample results are presented in a series of tables (Table 2s) associated with Sections 2 through 9 of this document. Tables 2.2 through 2.9 present the final data for the various analytical methods that are addressed in Sections 2 through 9 (i.e., VOCs presented in Table 2.2, SVOCs presented in Table 2.3). Ammonia and percent solids/moisture were combined with the anion results in Table 2.5.

Documentation of data validation actions is presented in a series of tables (Table 3s) associated with Sections 2 through 9 of this document. Tables 3.2 through 3.9 present final results that have been qualified (data validation has resulted in revisions to the laboratory result) for the various analytical methods that are addressed in Sections 2 through 9 as well as the associated validation reason codes. Ammonia and percent solids/moisture have been included with anions in Table 3.5. An index of the reason codes is presented on the last page of Table 3. There are no tables 3.7 and 3.8 because no validation actions were taken for the associated methods.

Tentatively identified compounds (TICs) were reported by the laboratory, if detected, in samples analyzed for VOCs and SVOCs. TICs were evaluated during validation and were removed from the data set if reported in associated method blanks. There were no VOC TICs reported in the final data set. SVOC TICs, discussed in Section 3, are presented by SDG in Table 4.1.

Soil performance evaluation (PE) samples were obtained from USEPA Region 1 New England for the following analyses: VOCs, SVOC, and target analyte list (TAL) metals. PE samples were submitted with field samples on June 8, 2011 to the TestAmerica – Westfield, Massachusetts laboratory. PE results were reported by the laboratory in SDG 360-34316-1. Results (Form 1s) were sent to USEPA Region 1 to be scored. USEPA score sheets are presented in Attachment A. Interpretations of PE sample results are presented in the applicable section for each method.

Equipment rinse blank OC-EBK-019 was reported by the laboratory with the surface water samples in SDGs 360-34315-1, OLN-71, and WIL-23. This equipment rinse blank was collected in association with soil samples collected in June 2011 and was used during the validation of these soil samples.

## 2.0 VOLATILE ORGANIC COMPOUNDS (VOCs)

Samples were analyzed for VOCs by method SW-846 8260C.

Data were reviewed for the following parameters:

- \* Data Completeness
  - \* Holding Times and Preservation
  - \* Blanks
  - \* Surrogate Recovery
  - \* Laboratory Control Sample (LCS)
  - \* Instrument Tunes
  - \* Initial and Continuing Calibration Standards
  - \* Internal Standards
  - \* Matrix Spikes
  - \* Field Duplicates
  - \* PE Samples
  - \* Detection Limits
  - \* Sample Result Verification / Electronic Data Deliverable (EDD)
  - \* TICs
- \* = indicates that criteria were met for this parameter

Except for the validation actions noted above, the results are interpreted to be usable as reported by the laboratory. A summary of final results is presented on Table 2.2. A summary of data validation actions is presented on Table 3.2.

### 2.1 Initial and Continuing Calibration Standards

#### SDG 360-34316-1

The initial calibration associated with all samples had mean relative response factors (RRFs) less than the USEPA Region I data validation guideline limit of 0.05 but greater than the Contract Laboratory Program (CLP) limit of 0.005 for tetrahydrofuran (0.046) and 1,4-dioxane (0.016). Tetrahydrofuran and 1,4-dioxane were not detected in any of the associated samples and based on professional judgment, reporting limits were qualified as estimated (UJ).

The percent differences between the RRF in the continuing calibration standard and the average RRF in the initial calibration were calculated and reported by the laboratory. The percent difference was above the USEPA Region I data validation guideline limit of 25 for 1,2,4-trimethylbenzene (43). The RRF was less than the USEPA Region I data validation guideline limit of 0.05 but greater than the CLP limit of 0.005 for 1,4-dioxane (0.016). 1,2,4-Trimethylbenzene and 1,4-dioxane were not detected in any of the associated samples and reporting limits were qualified as estimated (UJ).

A summary of initial and continuing calibration qualification actions is presented in Table 3.2 for VOCs with results being assigned a validation qualifier reason code of Initial Calibration Verification Relative Response Factor (ICVRRF), Continuing Calibration Verification Relative Response Factor (CCVRRF), and Continuing Calibration Verification Percent Difference (CCV%D).

## **2.2 Matrix Spikes**

### **SDG 360-34316-1**

The matrix spike and/or matrix spike duplicate (MS and/or MSD) associated with sample OC-SS-448-0.0/1.0-XXX and its field duplicate OC-SS-448-0.0/1.0-DUP had percent recoveries less than the lower quality control (QC) limit of 70 for 1,2,3-trichlorobenzene (46 and 46), 1,2,4-trichlorobenzene (50 and 47), 1,3-dichlorobenzene (68), hexachlorobutadiene (45 and 43), and naphthalene (63 and 65), which may indicate low bias (-L). 1,2,3-Trichlorobenzene, 1,2,4-trichlorobenzene, 1,3-dichlorobenzene, hexachlorobutadiene, and naphthalene were not detected in associated samples OC-SS-448-0.0/1.0-XXX and OC-SS-448-0.0/1.0-DUP and reporting limits were qualified as estimated (UJ).

## **2.3 Performance Evaluation Sample**

Two soil VOC PE samples (OC-PE-VS0428-VOC and OC-PE-VS0535-VOC) were obtained from USEPA Region 1 New England and submitted for analysis by Method 8260C. The majority of results reported by TestAmerica received a "PASS – Within Limits". A subset of compounds was scored "FAIL - Action High" including carbon disulfide, trans-1,2-dichloroethene, 1,1,1-trichloroethane, acetone, and 1,1-dichloroethane. Score sheets are presented in Attachment A. These compounds were not detected in any samples, and no qualification action was taken based on the high PE scores.

### 3.0 SEMIVOLATILE ORGANIC COMPOUNDS

Samples were analyzed for SVOCs by Method 8270D (low level method). A subset of samples was also analyzed with a cleanup separation step for diphenylamine (DPA) and for N-nitrosodimethylamine (NDMA) by modified Method 8270. Data validation actions for these methods are also reported in this section.

Data were reviewed for the following parameters:

- \* Data Completeness
  - \* Holding Times and Preservation
  - Blanks
  - \* Instrument Tunes
  - Initial and Continuing Calibration Standards
  - \* LCS
  - Matrix Spikes
  - \* Field Duplicates
  - \* Surrogate Recovery
  - \* Internal Standards
  - \* Detection Limits
  - \* USEPA PE sample
  - \* Sample Result Verification/EDD
  - \* TICs
- \* = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory. A summary of final results is presented on Table 2.3. A summary of data validation actions is presented on Table 3.3.

#### 3.1 Blanks

A subset of analyte results was qualified due to detections in the field blanks. A summary of blank qualification actions is presented in Table 3.3. Results qualified due to blanks were assigned reason code BL2.

#### SDG 360-34316-1

2,6-Dinitrotoluene (15 micrograms per kilogram [ $\mu\text{g}/\text{kg}$ ]), benzoic acid (19.7  $\mu\text{g}/\text{kg}$ ), caprolactum (16.4  $\mu\text{g}/\text{kg}$ ) and various TICs were reported in the method blank associated with all samples. Action levels were established at five times the reported 2,6-dinitrotoluene, benzoic acid, and caprolactum blank concentration. 2,6-Dinitrotoluene and caprolactum were not detected; no qualification was required. Sample detections of benzoic acid were greater than the action level; no qualification was required. Method blank TICs that were reported in associated samples were rejected and not reported in the final data.

Acetophenone (1.2 micrograms per liter [ $\mu\text{g/L}$ ]), benzoic acid (1.9  $\mu\text{g/L}$ ), butyl benzyl phthalate (1.3  $\mu\text{g/L}$ ), caprolactum (0.81  $\mu\text{g/L}$ ), diethyl phthalate (2.9  $\mu\text{g/L}$ ), dimethylphthalate (0.94  $\mu\text{g/L}$ ), di-n-butyl phthalate (1.1  $\mu\text{g/L}$ ), and various TICs were reported in the equipment rinsate blank associated with all samples. Reported detections for benzoic acid were qualified (EB) to indicate associated detections in equipment blanks. With the exception of benzoic acid, these compounds were not detected in associated samples. Equipment blank TICs that were reported in associated samples were rejected and not reported in the final data.

### 3.2 Continuing Calibration Standards

A subset of sample results was qualified due to continuing calibration percent differences that were outside project QC goals. Qualified results are summarized on Table 3.3 with reason code CCV%D.

#### SDG 360-34316-1

In the continuing calibration associated with a subset of samples, the percent difference for 2,4-dinitrophenol (-30), 4,6-dinitro-2-methylphenol (-35), and benzo(g,h,i)perylene (35) exceeded the QC limit of  $\pm 25$ . 2,4-Dinitrophenol and 4,6-dinitro-2-methylphenol were not detected and were qualified estimated (UJ) at the reporting limits. The sample results for benzo(g,h,i)perylene were qualified estimated (J).

### 3.3 Matrix Spikes

A subset of sample results was qualified due to MS/MSD percent recoveries that were outside project QC goals. Qualified results are summarized on Table 3.3 with reason code MS-L.

#### SDG 360-34316-1

Sample OC-SS-448-0.0/1.0-XXX was submitted for MS/MSD analysis. The MS and/or MSD percent recovery of 3,3'-dichlorobenzidine (0 and 0), 4-chloroaniline (38), aniline (0 and 0), benzo(b)fluoranthene (173), benzo(g,h,i)perylene (154), bis(2-ethylhexyl)phthalate (198 and 383), dibenz(ah)anthracene (181 and 166), hexachlorocyclopentadiene (0 and 20), and indeno(1,2,3-cd)pyrene (144) were outside of the QC limits. Associated samples are OC-SS-448-0.0/1.0-XXX and OC-SS-448-0.0/1.0-DUP. 3,3'-Dichlorobenzidine, aniline, and hexachlorocyclopentadiene were not detected and results were qualified rejected (R). 4-Chloroaniline was not detected and was qualified estimated (UJ) at the reporting limits. The associated sample results for benzo(b)fluoranthene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene were qualified estimated (J). Dibenz(ah)anthracene was not detected; no qualification was required. The unspiked sample concentration for bis(2-ethylhexyl)phthalate was greater than four times the spiking concentration; no qualification was required.

### **3.4 Performance Evaluation Results**

One soil SVOC PE sample (OC-PE-SS1507-SVOC) was obtained from USEPA Region 1 New England and submitted for analysis by Method 8270D. Compound results reported by TestAmerica - Westfield, MA (Sample ID: OC-PE-S80479-SVOC) received a “PASS – Within Limits” for all target analytes reported. Score sheets are presented in Attachment A.

## 4.0 TAL METALS (Including Mercury)

Samples were analyzed for TAL metals by SW-846 Method 6010C and mercury by SW-846 Method 7471A. Data were reviewed for the following parameters:

- \* Data Completeness
  - \* Sample Preservation and Holding Times
  - Blanks
  - \* Initial and Continuing Calibration Standards
  - \* LCS
  - Matrix Spike Analysis
  - \* Field Duplicates
  - \* Laboratory Duplicate Analysis
  - Interference Check Sample
  - \* Internal Standards (inductively coupled plasma [ICP-MS])
  - \* Serial Dilution Analysis
  - \* Detection Limits
  - \* Total and Dissolved metals Concentration Comparison
  - \* Sample Result Verification/EDD
  - \* PE Samples
- \* = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory. A summary of final results is presented on Table 2.4. A summary of data validation actions is presented on Table 3.4.

### 4.1 Blanks

A subset of analyte results were qualified due to detections in the method and/or continuing calibration blanks. A summary of blank qualification actions is presented in Table 3.7. Results qualified due to blanks were assigned reason code BL1. A detailed discussion of qualification actions are presented in the following sections.

The laboratory qualified sample results associated with method blank detections with a B. After review of the method blanks, the B qualifiers were removed.

#### SDG 360-34316-1

Sodium (49 milligrams per kilogram [mg/kg]) and tin (1.23 mg/kg) were detected in the method blank associated with samples in SDG 360-34316-1. Action levels were established at five times the concentration reported in the blank and compared to sample results. Low concentration detections of sodium and tin below the reporting limits and action levels were qualified non-detect (U) at the reporting limit in associated samples.

#### **4.2 Matrix Spike Analysis**

Matrix spike percent recovery results were evaluated using recovery limits of 75-125 percent. Qualified results are summarized on Table 3.4 with reason code MS-L.

##### **SDG 360-34316-1**

A matrix spike/matrix spike duplicate analysis was performed on sample OC-SS-448-0.0/1.0-XXX. The percent recoveries of antimony (40 and 42) were below the lower control limit. Antimony was not detected in associated samples and the reporting limit was qualified as estimated (UJ).

#### **4.3 Interference Check Standard**

A summary of interference check standard qualification actions is presented in Table 3.7 for metals with results being assigned a qualifier reason code of IFCS-L.

##### **SDG 360-34316-1**

Antimony (-4.2 µg/L) was detected above the control limit of minus two times the method detection limit (MDL) in the Interference Check Sample Mix A (ICSA) check standard analyzed in SDG 360-34316-1. The following samples had concentrations of aluminum, magnesium, iron and/or calcium that were greater than 50,000 µg/L: OC-SS-452-0.0/1.0-XXX, OC-SS-433-0.0/1.0-XXX, OC-SS-448-0.0/1.0-DUP, and OC-SS-448-0.0/1.0-XXX. Arsenic was not detected in these samples and the reporting limit was qualified estimated (UJ).

#### **4.4 Performance Evaluation Samples**

One soil mercury PE sample (OC-PE-IS6642-HG) was obtained from USEPA Region 1 New England and submitted for analysis by Method 7471A. Results reported by TestAmerica, Westfield, MA received a “PASS – Within Limits” score. Score sheets are presented in Attachment A.

One soil total metals PE sample (OC-PE-MS00718-METAL) was obtained from USEPA Region 1 New England and submitted for analysis by Method 6010C. Results reported by TestAmerica – Westfield, MA received a “PASS – Within Limits” for all target analytes reported. Score sheets are presented in Attachment A.

## 5.0 GENERAL CHEMISTRY

General chemistry includes analysis for ammonia by QuikChem: Lachat Method 10-107-06-1-B; chloride, nitrate, nitrite, and sulfate by USEPA Method 300; and percent solids/moisture by USEPA Method 160.3. With the exception of percent solids, an Olin Level 1 validation was performed on the data. A chemist review was performed on percent solids. Data were reviewed for the following parameters:

- \* Data Completeness
  - \* Holding Time
  - \* Blanks
  - \* LCS
  - \* Matrix Spike Analysis
  - \* Laboratory Duplicate Analysis
  - Field Duplicates
  - \* Detection Limits
  - \* Sample Result Verification/EDD
- \* = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory. A summary of final results is presented on Table 2.5. A summary of data validation actions is presented on Table 3.5.

### 5.1 Field Duplicates

Field duplicate relative percent difference (RPD) results were evaluated using a limit of 50 percent. Qualified results are summarized on Table 3.5 with reason code FD.

#### SDG 360-34316-1

The RPD QC limit of 50 was exceeded in sample OC-SS-448-0.0/0.1-XXX for sulfate (57). The results for sulfate in sample OC-SS-448-0.0/0.1-XXX and the associated duplicate were qualified estimated (J).

## 6.0 FORMALDEHYDE/ACETALDEHYDE

Samples were analyzed for formaldehyde and acetaldehyde by SW-846 Method 8315. Data were reviewed for the following parameters:

- \* Data Completeness
  - Holding Time
  - \* Blanks
  - \* Initial and Continuing Calibration Standards
  - \* LCS
  - Matrix Spike Analysis
  - \* Laboratory Duplicate Analysis
  - \* Field Duplicates
  - \* Detection Limits
  - \* Sample Result Verification/EDD
- \* = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory. A summary of final results is presented on Table 2.6. A summary of data validation actions is presented on Table 3.6.

### 6.1 Holding Time

#### SDG 360-34316-1

Samples were extracted three days beyond hold time. Results and reporting limits were qualified estimated (J/UJ). Qualified results are summarized in Table 3.6 with reason code HT.

### 6.2 Matrix Spike Analysis

A subset of sample results was qualified due to MS/MSD percent recoveries that were outside project QC goals. Qualified results are summarized in Table 3.6 with reason code MS-L.

#### SDG 360-34316-1

Sample OC-SS-448-0.0/1.0-XXX was submitted for MS/MSD analysis. The MS and/or MSD percent recovery of formaldehyde (74 and 67) and acetaldehyde (72) were less than the lower QC limit of 75. Associated samples are OC-SS-448-0.0/1.0-XXX and OC-SS-448-0.0/1.0-DUP. The associated sample results for formaldehyde were qualified estimated (J). Acetaldehyde was not detected and the reporting limits were qualified estimated (UJ).

## 7.0 PHTHALIC ANHYDRIDE

Samples were analyzed for phthalic anhydride by a laboratory specific modified method 8000 – High Performance Liquid Chromatography (HPLC) (TestAmerica – Tallahassee: method LC65). A chemist review was performed on the phthalic anhydride data set. Data were reviewed for the following parameters:

- \* Data Completeness
  - \* Holding Times and Preservation
  - \* Blanks
  - \* Initial Calibration Standards (10% of the data set)
  - \* Initial Calibration Verification (ICV) Standards (10% of the data set)
  - \* Continuing Calibration Standards (10% of the data set)
  - \* LCS
  - \* MS/MSD
  - \* Field Duplicates
  - \* Detection Limits
  - \* Dual Column Confirmation
  - \* Sample Result Verification/EDD
- \* = indicates that criteria were met for this parameter

The results are interpreted to be usable as reported by the laboratory. A summary of final results is presented on Table 2.7.

## 8.0 HYDRAZINE, MONO-METHYLHYDRAZINE, UNSYMMETRICAL DIMETHYLHYDRAZINE

Samples were analyzed for hydrazine, monomethylhydrazine (MMH), and unsymmetrical dimethylhydrazine (UDMH) by a modified SW-846 Method 8315A LC/MS/MS. Data were reviewed for the following parameters:

- \* Data Completeness
  - \* Holding Time and Sample Preservation
  - \* Blanks
  - \* Initial and Continuing Calibration Standards
  - \* LCS
  - \* Matrix Spike Analysis
  - \* Field Duplicates
  - \* Detection Limits
  - \* Sample Result Verification/EDD
- \* = indicates that criteria were met for this parameter

Results are interpreted to be usable as reported by the laboratory. A summary of final results is presented on Table 2.8.

### 8.1 Matrix Spike

#### SDG 360-34316-1

Very low recoveries (6-10 percent) of all three hydrazine compounds were reported by the laboratory in both the MS and MSD runs. The recovery of all hydrazine compounds in the LCS were within the method limits indicating that the laboratory method was getting good recovery in a clean soil matrix. Hydrazine compounds are known to be unstable, and the low recoveries in the soil collected from the site are interpreted to indicate that chemical conditions in the soil are causing degradation of the hydrazine compounds. Based on professional judgment sample results were not qualified due to the low matrix spike recoveries.

## 9.0 N, N-DIMETHYLFORMAMIDE

Samples were analyzed for N, N-dimethylformamide (DMF) by a modified SW-846 Method 8033 GC/NPD. Data were reviewed for the following parameters:

- \* Data Completeness
- \* Holding Time
- \* Blanks
- \* Initial and Continuing Calibration Standards
- \* LCS
- Matrix Spike Analysis
- \* Surrogate Recovery
- \* Laboratory Duplicate Analysis
- \* Field Duplicates
- \* Detection Limits
- \* Sample Result Verification/EDD

\* = indicates that criteria were met for this parameter

Except for the validation actions noted below, the results are interpreted to be usable as reported by the laboratory. A summary of final results is presented on Table 2.9. A summary of data validation actions is presented on Table 3.9.

### 9.1 Matrix Spike

#### SDG 360-34316-1

MS/MSD percent recoveries for DMF in sample OC-SS-448-0.0/1.0-XXX (28 and 35) were less than the lower QC limit of 70. DMF was not detected in the associated samples and the reporting limits were qualified estimated (UJ).

## 10.0 REFERENCES

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USEPA, 1996b. "Region 1 EPA-NE Data Validation Guidelines for Evaluating Environmental Analyses"; Quality Assurance Unit Staff; Office of Environmental Measurement and Evaluation; December 1996.

Data validation was completed by project chemists:  
Brad LaForest  
Michael Washburn  
Tige Cunningham – NRCC-EAC  
Wolfgang Calicchio

## **TABLES**

**Table 1  
Sample Summary  
Data Validation Report  
June 2011 OU1 Soil Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

Location	Field Sample ID	Date Sampled	Test America - Massachusetts								Test America - Florida		
			Lab Sample ID	SW8260C	SW8270	WS-MS-0012	SW6010	SW7470A/ SW7471A	E300	LACH_107 _06_1_B	E160_3	SW8315	LC65
				VOCs	SVOCs	NDMA/ NDPA	Metals	Mercury	Anions	Ammonia	Percent Solid	Formaldehyde/ Acetaldehyde	Phthalic Anhydride
<i>Field Samples</i>													
SS-452	OC-SS-452-0.0/1.0-XXX	08-Jun-11	360-34316-1	77	79		23	1	4	1	2		
SS-433	OC-SS-433-0.0/1.0-XXX	08-Jun-11	360-34316-7	77	79		23	1	4	1	2		
SS-448	OC-SS-448-0.0/1.0-DUP	08-Jun-11	360-34316-8	77	80		23	1	4	1	2	2	1
SS-448	OC-SS-448-0.0/1.0-XXX	08-Jun-11	360-34316-9	77	80		23	1	4	1	2	2	1
PE Sample	OC-PE-IS6642-HG	08-Jun-11	360-34316-2					1			2		
PE Sample	OC-PE-MS00718-METAL	08-Jun-11	360-34316-3				23				2		
PE Sample	OC-PE-SS1507-SVOC	08-Jun-11	360-34316-4		79						2		
PE Sample	OC-PE-VS0428-VOC	08-Jun-11	360-34316-5	77							2		
PE Sample	OC-PE-VS0535-VOC	08-Jun-11	360-34316-6	77							2		
TRIP BLANK	OC-TBK-081	08-Jun-11	360-34316-10	77									
RINSE BLANK	OC-EBK-019	08-Jun-11	360-34315-13	77	73	2	23	1	5	1		2	1

Location	Field Sample ID	Date Sampled	Lancaster		Katahdin	
			Lab Sample ID	SW8315A MOD	Lab Sample ID	SW8033M
				Hydrazine		Dimethyl formamide
<i>Field Samples</i>						
SS-448	OC-SS-448-0.0/1.0-DUP	08-Jun-11	6310728	3	SE3249-1	1
SS-448	OC-SS-448-0.0/1.0-XXX	08-Jun-11	6310729	3	SE3249-2	1
RINSE BLANK	OC-EBK-019	08-Jun-11	6310727	3	SE3250-7	1

Prepared by / Date: KJC 09/12/11  
Checked by / Date: TLC 10/06/11

Notes:

Number listed under method indicates number of target analytes reported.

**Table 2.2**  
**Final Results Summary - VOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

			Loc Name	SS-433	SS-448	SS-448	SS-452
			Field Sample ID	OC-SS-433-0.0/1.0-XXX	OC-SS-448-0.0/1.0-DUP	OC-SS-448-0.0/1.0-XXX	OC-SS-452-0.0/1.0-XXX
			Field Sample Date	06/08/11	06/08/11	06/08/11	06/08/11
			QC Code	FS	FD	FS	FS
			Lab Sample Delivery Group	360-34316-1	360-34316-1	360-34316-1	360-34316-1
Frac	Method	Analyte	Units	Result	Qual	Result	Qual
N	SW8260C	1,1,1,2-Tetrachloroethane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,1,1-Trichloroethane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,1,2,2-Tetrachloroethane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/Kg	19 U		16 U	
N	SW8260C	1,1,2-Trichloroethane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,1-Dichloroethane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,1-Dichloroethene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,1-Dichloropropene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,2,3-Trichlorobenzene	ug/Kg	3.9 U		3.1 UJ	
N	SW8260C	1,2,3-Trichloropropane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,2,4-Trichlorobenzene	ug/Kg	3.9 U		3.1 UJ	
N	SW8260C	1,2,4-Trimethylbenzene	ug/Kg	3.9 UJ		3.1 UJ	
N	SW8260C	1,2-Dibromo-3-chloropropane	ug/Kg	39 U		31 U	
N	SW8260C	1,2-Dibromoethane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,2-Dichlorobenzene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,2-Dichloroethane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,2-Dichloropropane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,3,5-Trimethylbenzene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,3-Dichlorobenzene	ug/Kg	3.9 U		3.1 UJ	
N	SW8260C	1,3-Dichloropropane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,4-Dichlorobenzene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	1,4-Dioxane	ug/Kg	390 UJ		310 UJ	
N	SW8260C	2,2-Dichloropropane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	2,4,4-Trimethyl-1-pentene	ug/Kg	7.8 U		6.3 U	
N	SW8260C	2,4,4-Trimethyl-2-pentene	ug/Kg	7.8 U		6.3 U	
N	SW8260C	2-Butanone	ug/Kg	39 U		31 U	
N	SW8260C	2-Chlorotoluene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	2-Hexanone	ug/Kg	39 U		31 U	
N	SW8260C	4-Chlorotoluene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	4-iso-Propyltoluene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	4-Methyl-2-pentanone	ug/Kg	39 U		31 U	
N	SW8260C	Acetic acid, methyl ester	ug/Kg	78 U		63 U	
N	SW8260C	Acetone	ug/Kg	390 U		310 U	
N	SW8260C	Benzene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	Bromobenzene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	Bromochloromethane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	Bromodichloromethane	ug/Kg	3.9 U		3.1 U	
N	SW8260C	Bromoform	ug/Kg	3.9 U		3.1 U	
N	SW8260C	Bromomethane	ug/Kg	7.8 U		6.3 U	
N	SW8260C	Butane, 2-methoxy-2-methyl-	ug/Kg	3.9 U		3.1 U	
N	SW8260C	Carbon disulfide	ug/Kg	3.9 U		3.1 U	
N	SW8260C	Carbon tetrachloride	ug/Kg	3.9 U		3.1 U	
N	SW8260C	Chlorobenzene	ug/Kg	3.9 U		3.1 U	
N	SW8260C	Chlorodibromomethane	ug/Kg	3.9 U		3.1 U	

**Table 2.2**  
**Final Results Summary - VOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				SS-433		SS-448		SS-448		SS-452	
Loc Name				OC-SS-433-0.0/1.0-XXX		OC-SS-448-0.0/1.0-DUP		OC-SS-448-0.0/1.0-XXX		OC-SS-452-0.0/1.0-XXX	
Field Sample ID				06/08/11		06/08/11		06/08/11		06/08/11	
Field Sample Date				FS		FD		FS		FS	
QC Code				360-34316-1		360-34316-1		360-34316-1		360-34316-1	
Lab Sample Delivery Group				Result		Result		Result		Result	
Units				Qual		Qual		Qual		Qual	
Frac	Method	Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
N	SW8260C	Chloroethane	ug/Kg	7.8	U	6.3	U	5.7	U	5.4	U
N	SW8260C	Chloroform	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Chloromethane	ug/Kg	7.8	U	6.3	U	5.7	U	5.4	U
N	SW8260C	Cis-1,2-Dichloroethene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	cis-1,3-Dichloropropene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Cyclohexane	ug/Kg	39	U	31	U	28	U	27	U
N	SW8260C	Dibromomethane	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Dichlorodifluoromethane	ug/Kg	7.8	U	6.3	U	5.7	U	5.4	U
N	SW8260C	Diethyl ether	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Ethyl benzene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Ethyl-t-Butyl Ether	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Hexachlorobutadiene	ug/Kg	3.9	U	3.1	UJ	2.8	UJ	2.7	U
N	SW8260C	Isopropyl ether	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Isopropylbenzene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Methyl cyclohexane	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Methyl Tertbutyl Ether	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Methylene chloride	ug/Kg	16	U	13	U	11	U	11	U
N	SW8260C	n-Butylbenzene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Naphthalene	ug/Kg	39	U	31	UJ	28	UJ	27	U
N	SW8260C	Propylbenzene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	sec-Butylbenzene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Styrene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	tert-Butylbenzene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Tetrachloroethene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Tetrahydrofuran	ug/Kg	39	UJ	31	UJ	28	UJ	27	UJ
N	SW8260C	Toluene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	trans-1,2-Dichloroethene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	trans-1,3-Dichloropropene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Trichloroethene	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Trichlorofluoromethane	ug/Kg	7.8	U	6.3	U	5.7	U	5.4	U
N	SW8260C	Vinyl chloride	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Xylene, o	ug/Kg	3.9	U	3.1	U	2.8	U	2.7	U
N	SW8260C	Xylenes (m&p)	ug/Kg	7.8	U	6.3	U	5.7	U	5.4	U

Notes:

- N = normal
- FS = field sample
- FD = field duplicate
- U = not detected, value is the detection limit
- J = value is estimated
- ug/Kg = microgram per kilogram

Prepared by / Date: KJC 09/09/11

Checked by / Date: BBL 09/09/11

**Table 2.2**  
**Final Results Summary - VOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

		Loc Name		RINSE BLANK
		Field Sample ID		OC-EBK-019
		Field Sample Date		06/08/11
		QC Code		EB
		Lab Sample Delivery Group		360-34315-1
Frac	Method	Analyte	Units	Result Qual
N	SW8260C	1,1,1,2-Tetrachloroethane	ug/L	1 U
N	SW8260C	1,1,1-Trichloroethane	ug/L	1 U
N	SW8260C	1,1,2,2-Tetrachloroethane	ug/L	0.5 U
N	SW8260C	1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/L	1 U
N	SW8260C	1,1,2-Trichloroethane	ug/L	1 U
N	SW8260C	1,1-Dichloroethane	ug/L	1 U
N	SW8260C	1,1-Dichloroethene	ug/L	1 U
N	SW8260C	1,1-Dichloropropene	ug/L	1 U
N	SW8260C	1,2,3-Trichlorobenzene	ug/L	1 U
N	SW8260C	1,2,3-Trichloropropane	ug/L	1 U
N	SW8260C	1,2,4-Trichlorobenzene	ug/L	1 U
N	SW8260C	1,2,4-Trimethylbenzene	ug/L	1 U
N	SW8260C	1,2-Dibromo-3-chloropropane	ug/L	5 U
N	SW8260C	1,2-Dibromoethane	ug/L	1 U
N	SW8260C	1,2-Dichlorobenzene	ug/L	1 U
N	SW8260C	1,2-Dichloroethane	ug/L	1 U
N	SW8260C	1,2-Dichloropropane	ug/L	1 U
N	SW8260C	1,3,5-Trimethylbenzene	ug/L	1 U
N	SW8260C	1,3-Dichlorobenzene	ug/L	1 U
N	SW8260C	1,3-Dichloropropane	ug/L	1 U
N	SW8260C	1,4-Dichlorobenzene	ug/L	1 U
N	SW8260C	1,4-Dioxane	ug/L	50 U
N	SW8260C	2,2-Dichloropropane	ug/L	1 U
N	SW8260C	2,4,4-Trimethyl-1-pentene	ug/L	1 U
N	SW8260C	2,4,4-Trimethyl-2-pentene	ug/L	1 U
N	SW8260C	2-Butanone	ug/L	10 U
N	SW8260C	2-Chlorotoluene	ug/L	1 U
N	SW8260C	2-Hexanone	ug/L	10 U
N	SW8260C	4-Chlorotoluene	ug/L	1 U
N	SW8260C	4-iso-Propyltoluene	ug/L	1 U
N	SW8260C	4-Methyl-2-pentanone	ug/L	10 U
N	SW8260C	Acetic acid, methyl ester	ug/L	20 U
N	SW8260C	Acetone	ug/L	50 U
N	SW8260C	Benzene	ug/L	1 U
N	SW8260C	Bromobenzene	ug/L	1 U
N	SW8260C	Bromochloromethane	ug/L	1 U
N	SW8260C	Bromodichloromethane	ug/L	0.5 U
N	SW8260C	Bromoform	ug/L	1 U
N	SW8260C	Bromomethane	ug/L	2 U
N	SW8260C	Butane, 2-methoxy-2-methyl-	ug/L	5 U
N	SW8260C	Carbon disulfide	ug/L	10 U
N	SW8260C	Carbon tetrachloride	ug/L	1 U
N	SW8260C	Chlorobenzene	ug/L	1 U

**Table 2.2**  
**Final Results Summary - VOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

		Loc Name		RINSE BLANK	
		Field Sample ID		OC-EBK-019	
		Field Sample Date		06/08/11	
		QC Code		EB	
		Lab Sample Delivery Group		360-34315-1	
Frac	Method	Analyte	Units	Result	Qual
N	SW8260C	Chlorodibromomethane	ug/L	0.5 U	
N	SW8260C	Chloroethane	ug/L	2 U	
N	SW8260C	Chloroform	ug/L	1.4	
N	SW8260C	Chloromethane	ug/L	2 U	
N	SW8260C	Cis-1,2-Dichloroethene	ug/L	1 U	
N	SW8260C	cis-1,3-Dichloropropene	ug/L	0.4 U	
N	SW8260C	Cyclohexane	ug/L	10 U	
N	SW8260C	Dibromomethane	ug/L	1 U	
N	SW8260C	Dichlorodifluoromethane	ug/L	1 U	
N	SW8260C	Diethyl ether	ug/L	10 U	
N	SW8260C	Ethyl benzene	ug/L	1 U	
N	SW8260C	Ethyl-t-Butyl Ether	ug/L	5 U	
N	SW8260C	Hexachlorobutadiene	ug/L	0.4 U	
N	SW8260C	Isopropyl ether	ug/L	10 U	
N	SW8260C	Isopropylbenzene	ug/L	1 U	
N	SW8260C	Methyl cyclohexane	ug/L	10 U	
N	SW8260C	Methyl Tertbutyl Ether	ug/L	1 U	
N	SW8260C	Methylene chloride	ug/L	2 U	
N	SW8260C	n-Butylbenzene	ug/L	1 U	
N	SW8260C	Naphthalene	ug/L	5 U	
N	SW8260C	Propylbenzene	ug/L	1 U	
N	SW8260C	sec-Butylbenzene	ug/L	1 U	
N	SW8260C	Styrene	ug/L	1 U	
N	SW8260C	tert-Butylbenzene	ug/L	1 U	
N	SW8260C	Tetrachloroethene	ug/L	1 U	
N	SW8260C	Tetrahydrofuran	ug/L	10 U	
N	SW8260C	Toluene	ug/L	1 U	
N	SW8260C	trans-1,2-Dichloroethene	ug/L	1 U	
N	SW8260C	trans-1,3-Dichloropropene	ug/L	0.4 U	
N	SW8260C	Trichloroethene	ug/L	1 U	
N	SW8260C	Trichlorofluoromethane	ug/L	1 U	
N	SW8260C	Vinyl chloride	ug/L	0.5 U	
N	SW8260C	Xylene, o	ug/L	1 U	
N	SW8260C	Xylenes (m&p)	ug/L	2 U	

Notes:

N = normal

EB = equipment rinsate blank

U = not detected

ug/L = microgram per liter

Prepared by / Date: KJC 09/09/11

Checked by / Date: BBL 09/09/11

**Table 2.2**  
**Final Results Summary - VOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

		Loc Name		TRIP BLANK
		Field Sample ID		OC-TBK-081
		Field Sample Date		06/08/11
		QC Code		TB
		Lab Sample Delivery Group		360-34316-1
Frac	Method	Analyte	Units	Result Qual
N	SW8260C	1,1,1,2-Tetrachloroethane	ug/Kg	2.5 U
N	SW8260C	1,1,1-Trichloroethane	ug/Kg	2.5 U
N	SW8260C	1,1,2,2-Tetrachloroethane	ug/Kg	2.5 U
N	SW8260C	1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/Kg	13 U
N	SW8260C	1,1,2-Trichloroethane	ug/Kg	2.5 U
N	SW8260C	1,1-Dichloroethane	ug/Kg	2.5 U
N	SW8260C	1,1-Dichloroethene	ug/Kg	2.5 U
N	SW8260C	1,1-Dichloropropene	ug/Kg	2.5 U
N	SW8260C	1,2,3-Trichlorobenzene	ug/Kg	2.5 U
N	SW8260C	1,2,3-Trichloropropane	ug/Kg	2.5 U
N	SW8260C	1,2,4-Trichlorobenzene	ug/Kg	2.5 U
N	SW8260C	1,2,4-Trimethylbenzene	ug/Kg	2.5 U
N	SW8260C	1,2-Dibromo-3-chloropropane	ug/Kg	25 U
N	SW8260C	1,2-Dibromoethane	ug/Kg	2.5 U
N	SW8260C	1,2-Dichlorobenzene	ug/Kg	2.5 U
N	SW8260C	1,2-Dichloroethane	ug/Kg	2.5 U
N	SW8260C	1,2-Dichloropropane	ug/Kg	2.5 U
N	SW8260C	1,3,5-Trimethylbenzene	ug/Kg	2.5 U
N	SW8260C	1,3-Dichlorobenzene	ug/Kg	2.5 U
N	SW8260C	1,3-Dichloropropane	ug/Kg	2.5 U
N	SW8260C	1,4-Dichlorobenzene	ug/Kg	2.5 U
N	SW8260C	1,4-Dioxane	ug/Kg	250 U
N	SW8260C	2,2-Dichloropropane	ug/Kg	2.5 U
N	SW8260C	2,4,4-Trimethyl-1-pentene	ug/Kg	5 U
N	SW8260C	2,4,4-Trimethyl-2-pentene	ug/Kg	5 U
N	SW8260C	2-Butanone	ug/Kg	25 U
N	SW8260C	2-Chlorotoluene	ug/Kg	2.5 U
N	SW8260C	2-Hexanone	ug/Kg	25 U
N	SW8260C	4-Chlorotoluene	ug/Kg	2.5 U
N	SW8260C	4-iso-Propyltoluene	ug/Kg	2.5 U
N	SW8260C	4-Methyl-2-pentanone	ug/Kg	25 U
N	SW8260C	Acetic acid, methyl ester	ug/Kg	50 U
N	SW8260C	Acetone	ug/Kg	250 U
N	SW8260C	Benzene	ug/Kg	2.5 U
N	SW8260C	Bromobenzene	ug/Kg	2.5 U
N	SW8260C	Bromochloromethane	ug/Kg	2.5 U
N	SW8260C	Bromodichloromethane	ug/Kg	2.5 U
N	SW8260C	Bromoform	ug/Kg	2.5 U
N	SW8260C	Bromomethane	ug/Kg	5 U
N	SW8260C	Butane, 2-methoxy-2-methyl-	ug/Kg	2.5 U
N	SW8260C	Carbon disulfide	ug/Kg	2.5 U
N	SW8260C	Carbon tetrachloride	ug/Kg	2.5 U
N	SW8260C	Chlorobenzene	ug/Kg	2.5 U

**Table 2.2**  
**Final Results Summary - VOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

		Loc Name		TRIP BLANK	
		Field Sample ID		OC-TBK-081	
		Field Sample Date		06/08/11	
		QC Code		TB	
		Lab Sample Delivery Group		360-34316-1	
Frac	Method	Analyte	Units	Result	Qual
N	SW8260C	Chlorodibromomethane	ug/Kg	2.5	U
N	SW8260C	Chloroethane	ug/Kg	5	U
N	SW8260C	Chloroform	ug/Kg	2.5	U
N	SW8260C	Chloromethane	ug/Kg	5	U
N	SW8260C	Cis-1,2-Dichloroethene	ug/Kg	2.5	U
N	SW8260C	cis-1,3-Dichloropropene	ug/Kg	2.5	U
N	SW8260C	Cyclohexane	ug/Kg	25	U
N	SW8260C	Dibromomethane	ug/Kg	2.5	U
N	SW8260C	Dichlorodifluoromethane	ug/Kg	5	U
N	SW8260C	Diethyl ether	ug/Kg	2.5	U
N	SW8260C	Ethyl benzene	ug/Kg	2.5	U
N	SW8260C	Ethyl-t-Butyl Ether	ug/Kg	2.5	U
N	SW8260C	Hexachlorobutadiene	ug/Kg	2.5	U
N	SW8260C	Isopropyl ether	ug/Kg	2.5	U
N	SW8260C	Isopropylbenzene	ug/Kg	2.5	U
N	SW8260C	Methyl cyclohexane	ug/Kg	2.5	U
N	SW8260C	Methyl Tertbutyl Ether	ug/Kg	2.5	U
N	SW8260C	Methylene chloride	ug/Kg	10	U
N	SW8260C	n-Butylbenzene	ug/Kg	2.5	U
N	SW8260C	Naphthalene	ug/Kg	25	U
N	SW8260C	Propylbenzene	ug/Kg	2.5	U
N	SW8260C	sec-Butylbenzene	ug/Kg	2.5	U
N	SW8260C	Styrene	ug/Kg	2.5	U
N	SW8260C	tert-Butylbenzene	ug/Kg	2.5	U
N	SW8260C	Tetrachloroethene	ug/Kg	2.5	U
N	SW8260C	Tetrahydrofuran	ug/Kg	25	U
N	SW8260C	Toluene	ug/Kg	2.5	U
N	SW8260C	trans-1,2-Dichloroethene	ug/Kg	2.5	U
N	SW8260C	trans-1,3-Dichloropropene	ug/Kg	2.5	U
N	SW8260C	Trichloroethene	ug/Kg	2.5	U
N	SW8260C	Trichlorofluoromethane	ug/Kg	5	U
N	SW8260C	Vinyl chloride	ug/Kg	2.5	U
N	SW8260C	Xylene, o	ug/Kg	2.5	U
N	SW8260C	Xylenes (m&p)	ug/Kg	5	U

Notes:

N = normal

TB = trip blank

U = not detected

ug/Kg = microgram per kilogram

Prepared by / Date: KJC 09/09/11

Checked by / Date: BBL 09/09/11

**Table 2.3**  
**Final Results Summary - SVOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name		SS-433		SS-448		SS-448		SS-452	
				Field Sample ID		OC-SS-433-0.0/1.0-XXX		OC-SS-448-0.0/1.0-DUP		OC-SS-448-0.0/1.0-XXX		OC-SS-452-0.0/1.0-XXX	
				Field Sample Date		06/08/11		06/08/11		06/08/11		06/08/11	
				QC Code		FS		FD		FS		FS	
				Lab Sample Delivery Group		360-34316-1		360-34316-1		360-34316-1		360-34316-1	
Frac	Method	Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
N	SW8270	1,2,4,5-Tetrachlorobenzene	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	1,2,4-Trichlorobenzene	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	1,2-Dichlorobenzene	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	1,3-Dichlorobenzene	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	1,4-Dichlorobenzene	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	1-Methylnaphthalene	ug/Kg	90 J		74 J		86 J		130 U			
N	SW8270	2,3,4,6-Tetrachlorophenol	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2,4,5-Trichlorophenol	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2,4,6-Trichlorophenol	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2,4-Dichlorophenol	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2,4-Dimethylphenol	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2,4-Dinitrophenol	ug/Kg	130 UJ		130 U		140 U		130 UJ			
N	SW8270	2,4-Dinitrotoluene	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2,6-Dinitrotoluene	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2-Chloronaphthalene	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2-Chlorophenol	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2-Methylnaphthalene	ug/Kg	130		94 J		110 J		43 J			
N	SW8270	2-Methylphenol	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	2-Nitroaniline	ug/Kg	650 U		640 U		710 U		640 U			
N	SW8270	2-Nitrophenol	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	3 & 4 Methylphenol	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	3,3'-Dichlorobenzidine	ug/Kg	260 U		R		R		250 U			
N	SW8270	3-Nitroaniline	ug/Kg	650 U		640 U		710 U		640 U			
N	SW8270	4,6-Dinitro-2-methylphenol	ug/Kg	650 UJ		640 U		710 U		640 UJ			
N	SW8270	4-Bromophenyl phenyl ether	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	4-Chloro-3-methylphenol	ug/Kg	260 U		260 U		280 U		250 U			
N	SW8270	4-Chloroaniline	ug/Kg	260 U		260 UJ		280 UJ		250 U			
N	SW8270	4-Chlorophenyl phenyl ether	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	4-Nitroaniline	ug/Kg	650 U		640 U		710 U		640 U			
N	SW8270	4-Nitrophenol	ug/Kg	650 U		640 U		710 U		640 U			
N	SW8270	Acenaphthene	ug/Kg	130 U		130 U		140 U		130 U			
N	SW8270	Acenaphthylene	ug/Kg	320		65 J		79 J		130 U			
N	SW8270	Acetophenone	ug/Kg	130 U		130 U		140 U		130 U			

**Table 2.3**  
**Final Results Summary - SVOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name		SS-433		SS-448		SS-448		SS-452	
				Field Sample ID		OC-SS-433-0.0/1.0-XXX		OC-SS-448-0.0/1.0-DUP		OC-SS-448-0.0/1.0-XXX		OC-SS-452-0.0/1.0-XXX	
				Field Sample Date		06/08/11		06/08/11		06/08/11		06/08/11	
				QC Code		FS		FD		FS		FS	
				Lab Sample Delivery Group		360-34316-1		360-34316-1		360-34316-1		360-34316-1	
Frac	Method	Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
N	SW8270	Aniline	ug/Kg	130	U		R		R		R	130	U
N	SW8270	Anthracene	ug/Kg	300		42	J	58	J	130		130	U
N	SW8270	Atrazine	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Azobenzene	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Benzaldehyde	ug/Kg	130	U	50	J	140	U	59		59	J
N	SW8270	Benzo(a)anthracene	ug/Kg	1400		220		270		63		63	J
N	SW8270	Benzo(a)pyrene	ug/Kg	920		200		220		66		66	J
N	SW8270	Benzo(b)fluoranthene	ug/Kg	1800		390	J	410	J	130		130	
N	SW8270	Benzo(ghi)perylene	ug/Kg	660	J	290	J	310	J	91		91	J
N	SW8270	Benzo(k)fluoranthene	ug/Kg	600		200		240		50		50	J
N	SW8270	Benzoic Acid	ug/Kg	230	JEB	160	JEB	190	JEB	200		200	JEB
N	SW8270	Benzyl alcohol	ug/Kg	260	U	260	U	280	U	250		250	U
N	SW8270	Biphenyl	ug/Kg	42	J	130	U	140	U	130		130	U
N	SW8270	Bis(2-Chloroethoxy)methane	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Bis(2-Chloroethyl)ether	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Bis(2-Chloroisopropyl)ether	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Bis(2-Ethylhexyl)phthalate	ug/Kg	370		1800		1600		400		400	
N	SW8270	Butylbenzylphthalate	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Caprolactam	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Carbazole	ug/Kg	160		130	U	140	U	130		130	U
N	SW8270	Chrysene	ug/Kg	1600		300		350		83		83	J
N	SW8270	Di-n-butylphthalate	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Di-n-octylphthalate	ug/Kg	130	U	130	U	140	U	68		68	J
N	SW8270	Dibenz(a,h)anthracene	ug/Kg	250		130	U	140	U	130		130	U
N	SW8270	Dibenzofuran	ug/Kg	83	J	57	J	57	J	130		130	U
N	SW8270	Diethylphthalate	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Dimethylphthalate	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Diphenyl ether	ug/Kg	62	J	71	J	79	J	130		130	U
N	SW8270	Diphenylamine	ug/Kg			130	U	140	U				
N	SW8270	Diphenylmethanone	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Fluoranthene	ug/Kg	3200		380		540		120		120	J
N	SW8270	Fluorene	ug/Kg	130	U	130	U	140	U	130		130	U
N	SW8270	Hexachlorobenzene	ug/Kg	130	U	130	U	140	U	130		130	U

**Table 2.3**  
**Final Results Summary - SVOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				SS-433		SS-448		SS-448		SS-452	
				OC-SS-433-0.0/1.0-XXX		OC-SS-448-0.0/1.0-DUP		OC-SS-448-0.0/1.0-XXX		OC-SS-452-0.0/1.0-XXX	
				06/08/11		06/08/11		06/08/11		06/08/11	
				FS		FD		FS		FS	
				360-34316-1		360-34316-1		360-34316-1		360-34316-1	
<b>Frac</b>	<b>Method</b>	<b>Analyte</b>	<b>Units</b>	<b>Result</b>	<b>Qual</b>	<b>Result</b>	<b>Qual</b>	<b>Result</b>	<b>Qual</b>	<b>Result</b>	<b>Qual</b>
N	SW8270	Hexachlorobutadiene	ug/Kg	130	U	130	U	140	U	130	U
N	SW8270	Hexachlorocyclopentadiene	ug/Kg	260	U		R		R	250	U
N	SW8270	Hexachloroethane	ug/Kg	130	U	130	U	140	U	130	U
N	SW8270	Indeno(1,2,3-cd)pyrene	ug/Kg	690		270	J	290	J	110	J
N	SW8270	Isophorone	ug/Kg	130	U	130	U	140	U	130	U
N	SW8270	N-Nitrosodi-n-propylamine	ug/Kg	130	U	130	U	140	U	130	U
N	SW8270	N-Nitrosodimethylamine	ug/Kg	130	U	130	U	140	U	130	U
N	SW8270	N-Nitrosodiphenylamine	ug/Kg	130	U	130	U	140	U	130	U
N	SW8270	Naphthalene	ug/Kg	400		120	J	180		130	U
N	SW8270	Nitrobenzene	ug/Kg	130	U	130	U	140	U	130	U
N	SW8270	Pentachlorophenol	ug/Kg	130	U	130	U	140	U	130	U
N	SW8270	Phenanthrene	ug/Kg	960		180		200		53	J
N	SW8270	Phenol	ug/Kg	130	U	130	U	140	U	130	U
N	SW8270	Pyrene	ug/Kg	2700		410		580		100	J

Notes:

N = normal

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

J = value is estimated

R = value is rejected

EB = compound detected in the associated equipment rinsate blank

ug/Kg = microgram per kilogram

Prepared by / Date: KJC 09/09/11

Checked by / Date: WDC 09/12/11

**Table 2.3  
Final Results Summary - SVOCs  
June 2011 Soil Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

			Loc Name	RINSE BLANK	
			Field Sample ID	OC-EBK-019	
			Field Sample Date	06/08/11	
			QC Code	EB	
			Lab Sample Delivery Group	360-34315-1	
Frac	Method	Analyte	Units	Result	Qual
N	SW8270	1,2,4,5-Tetrachlorobenzene	ug/l	4.5	U
N	SW8270	1-Methylnaphthalene	ug/l	4.5	U
N	SW8270	2,3,4,6-Tetrachlorophenol	ug/l	4.5	U
N	SW8270	2,4,5-Trichlorophenol	ug/l	4.5	U
N	SW8270	2,4,6-Trichlorophenol	ug/l	4.5	U
N	SW8270	2,4-Dichlorophenol	ug/l	4.5	U
N	SW8270	2,4-Dimethylphenol	ug/l	4.5	U
N	SW8270	2,4-Dinitrophenol	ug/l	4.5	U
N	SW8270	2,4-Dinitrotoluene	ug/l	4.5	U
N	SW8270	2,6-Dinitrotoluene	ug/l	4.5	U
N	SW8270	2-Chloronaphthalene	ug/l	4.5	U
N	SW8270	2-Chlorophenol	ug/l	4.5	U
N	SW8270	2-Methylnaphthalene	ug/l	0.91	U
N	SW8270	2-Methylphenol	ug/l	4.5	U
N	SW8270	2-Nitroaniline	ug/l	4.5	U
N	SW8270	2-Nitrophenol	ug/l	4.5	U
N	SW8270	3 & 4 Methylphenol	ug/l	4.5	U
N	SW8270	3,3'-Dichlorobenzidine	ug/l	4.5	U
N	SW8270	3-Nitroaniline	ug/l	4.5	U
N	SW8270	4,6-Dinitro-2-methylphenol	ug/l	4.5	U
N	SW8270	4-Bromophenyl phenyl ether	ug/l	4.5	U
N	SW8270	4-Chloro-3-methylphenol	ug/l	4.5	U
N	SW8270	4-Chloroaniline	ug/l	4.5	U
N	SW8270	4-Chlorophenyl phenyl ether	ug/l	4.5	U
N	SW8270	4-Nitroaniline	ug/l	4.5	U
N	SW8270	4-Nitrophenol	ug/l	4.5	U
N	SW8270	Acenaphthene	ug/l	0.91	U
N	SW8270	Acenaphthylene	ug/l	0.27	U
N	SW8270	Acetophenone	ug/l	1.2	J
N	SW8270	Aniline	ug/l	4.5	U
N	SW8270	Anthracene	ug/l	0.91	U

**Table 2.3  
Final Results Summary - SVOCs  
June 2011 Soil Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

			Loc Name	RINSE BLANK	
			Field Sample ID	OC-EBK-019	
			Field Sample Date	06/08/11	
			QC Code	EB	
			Lab Sample Delivery Group	360-34315-1	
Frac	Method	Analyte	Units	Result	Qual
N	SW8270	Atrazine	ug/l	4.5	U
N	SW8270	Azobenzene	ug/l	4.5	U
N	SW8270	Benzaldehyde	ug/l	4.5	U
N	SW8270	Benzo(a)anthracene	ug/l	0.27	U
N	SW8270	Benzo(a)pyrene	ug/l	0.18	U
N	SW8270	Benzo(b)fluoranthene	ug/l	0.27	U
N	SW8270	Benzo(ghi)perylene	ug/l	0.45	U
N	SW8270	Benzo(k)fluoranthene	ug/l	0.27	U
N	SW8270	Benzoic Acid	ug/l	1.9	J
N	SW8270	Benzyl alcohol	ug/l	9.1	U
N	SW8270	Biphenyl	ug/l	4.5	U
N	SW8270	Bis(2-Chloroethoxy)methane	ug/l	4.5	U
N	SW8270	Bis(2-Chloroethyl)ether	ug/l	4.5	U
N	SW8270	Bis(2-Chloroisopropyl)ether	ug/l	4.5	U
N	SW8270	Bis(2-Ethylhexyl)phthalate	ug/l	1.8	U
N	SW8270	Butylbenzylphthalate	ug/l	1.3	J
N	SW8270	Caprolactum	ug/l	0.81	J
N	SW8270	Carbazole	ug/l	4.5	U
N	SW8270	Chrysene	ug/l	0.91	U
N	SW8270	Di-n-butylphthalate	ug/l	1.1	J
N	SW8270	Di-n-octylphthalate	ug/l	4.5	U
N	SW8270	Dibenz(a,h)anthracene	ug/l	0.45	U
N	SW8270	Dibenzofuran	ug/l	4.5	U
N	SW8270	Diethylphthalate	ug/l	2.9	J
N	SW8270	Dimethylphthalate	ug/l	0.94	J
N	SW8270	Diphenyl ether	ug/l	4.5	U
N	SW8270	Diphenylamine	ug/l	4.5	U
N	SW8270	Diphenylmethanone	ug/l	4.5	U
N	SW8270	Fluoranthene	ug/l	0.91	U
N	SW8270	Fluorene	ug/l	0.91	U
N	SW8270	Hexachlorobenzene	ug/l	0.91	U

**Table 2.3  
Final Results Summary - SVOCs  
June 2011 Soil Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

			Loc Name	RINSE BLANK	
			Field Sample ID	OC-EBK-019	
			Field Sample Date	06/08/11	
			QC Code	EB	
			Lab Sample Delivery Group	360-34315-1	
Frac	Method	Analyte	Units	Result	Qual
N	SW8270	Hexachlorocyclopentadiene	ug/l	4.5	U
N	SW8270	Hexachloroethane	ug/l	2.7	U
N	SW8270	Indeno(1,2,3-cd)pyrene	ug/l	0.45	U
N	SW8270	Isophorone	ug/l	4.5	U
N	SW8270	N-Nitrosodi-n-propylamine	ug/l	4.5	U
N	SW8270	N-Nitrosodiphenylamine	ug/l	4.5	U
N	SW8270	Nitrobenzene	ug/l	4.5	U
N	SW8270	Pentachlorophenol	ug/l	0.91	U
N	SW8270	Phenanthrene	ug/l	0.18	U
N	SW8270	Phenol	ug/l	4.5	U
N	SW8270	Pyrene	ug/l	4.5	U

Notes:

N = normal

EB = Equipment Rinsate Blank

U = not detected, value is the detection limit

J = value is estimated

ug/l = microgram per liter

Prepared by / Date: KJC 09/01/11

Checked by / Date: WDC 09/12/11

**Table 2.4**  
**Final Results Summary - Metals**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name		SS-433		SS-448		SS-448		SS-452	
				Field Sample ID		OC-SS-433-0.0/1.0-XXX		OC-SS-448-0.0/1.0-DUP		OC-SS-448-0.0/1.0-XXX		OC-SS-452-0.0/1.0-XXX	
				Field Sample Date		06/08/11		06/08/11		06/08/11		06/08/11	
				QC Code		FS		FD		FS		FS	
				Lab Sample Delivery Group		360-34316-1		360-34316-1		360-34316-1		360-34316-1	
Frac	Method	Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
T	SW6010	Aluminum	mg/Kg	6900		7000		6700		7700			
T	SW6010	Antimony	mg/Kg	0.56	UJ	0.61	UJ	0.61	UJ	0.55	UJ		
T	SW6010	Arsenic	mg/Kg	32		24		23		12			
T	SW6010	Barium	mg/Kg	19		22		21		35			
T	SW6010	Beryllium	mg/Kg	0.25		0.27		0.27		0.28			
T	SW6010	Cadmium	mg/Kg	0.064	J	0.065	J	0.069	J	0.041	J		
T	SW6010	Calcium	mg/Kg	1300		7300		5400		6900			
T	SW6010	Chromium	mg/Kg	14		16		19		85			
T	SW6010	Cobalt	mg/Kg	2.9		3.4		3.8		4.5			
T	SW6010	Copper	mg/Kg	23		21		20		12			
T	SW6010	Iron	mg/Kg	13000		12000		13000		14000			
T	SW6010	Lead	mg/Kg	16		15		13		8.3			
T	SW6010	Magnesium	mg/Kg	2000		2300		2300		3700			
T	SW6010	Manganese	mg/Kg	110		130		140		160			
T	SW7471A	Mercury	mg/Kg	0.066	U	0.02	J	0.074	U	0.029	J		
T	SW6010	Nickel	mg/Kg	9.3		11		13		12			
T	SW6010	Potassium	mg/Kg	1000		980		1000		1700			
T	SW6010	Selenium	mg/Kg	0.56	U	0.61	U	0.61	U	0.55	U		
T	SW6010	Silver	mg/Kg	0.56	U	0.61	U	0.61	U	0.55	U		
T	SW6010	Sodium	mg/Kg	110	U	120	U	120	U	110	U		
T	SW6010	Thallium	mg/Kg	1.1	U	1.2	U	1.2	U	1.1	U		
T	SW6010	Tin	mg/Kg	5.6	U	6.1	U	6.1	U	5.5	U		
T	SW6010	Vanadium	mg/Kg	13		13		14		20			
T	SW6010	Zinc	mg/Kg	20		22		22		28			

Notes:

T = Total (unfiltered)

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

J = value is estimated

mg/Kg = milligram per kilogram

Prepared by / Date: KJC 09/09/11

Checked by / Date: TLC 09/09/11

**Table 2.4  
Final Results Summary - Metals  
June 2011 Soil Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

				Loc Name	RINSE BLANK	
				Field Sample ID	OC-EBK-019	
				Field Sample Date	06/08/11	
				QC Code	EB	
				Lab Sample Delivery Group	360-34315-1	
Frac	Method	Analyte	Units	Result	Qual	
T	SW6010	Aluminum	ug/L	36	J	
T	SW6010	Antimony	ug/L	6	U	
T	SW6010	Arsenic	ug/L	10	U	
T	SW6010	Barium	ug/L	8.7	J	
T	SW6010	Beryllium	ug/L	1	U	
T	SW6010	Cadmium	ug/L	1	U	
T	SW6010	Calcium	ug/L	190	J	
T	SW6010	Chromium	ug/L	5	U	
T	SW6010	Cobalt	ug/L	10	U	
T	SW6010	Copper	ug/L	10	U	
T	SW6010	Iron	ug/L	57	J	
T	SW6010	Lead	ug/L	5	U	
T	SW6010	Magnesium	ug/L	400	U	
T	SW6010	Manganese	ug/L	10	U	
T	SW7470A	Mercury	ug/L	0.2	U	
T	SW6010	Nickel	ug/L	10	U	
T	SW6010	Potassium	ug/L	4000	U	
T	SW6010	Selenium	ug/L	10	U	
T	SW6010	Silver	ug/L	5	U	
T	SW6010	Sodium	ug/L	310	J	
T	SW6010	Thallium	ug/L	10	U	
T	SW6010	Tin	ug/L	50	U	
T	SW6010	Vanadium	ug/L	10	U	
T	SW6010	Zinc	ug/L	20	J	

Notes:

T = Total (unfiltered)

EB = Equipment Rinsate Blank

U = not detected, value is the detection limit

J = value is estimated

ug/L = microgram per liter

Prepared by / Date: KJC 09/06/11

Checked by / Date: TLC 09/06/11

**Table 2.5**  
**Final Results Summary - General Chemistry**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				SS-433		SS-448		SS-448		SS-452	
				OC-SS-433-0.0/1.0-XXX		OC-SS-448-0.0/1.0-DUP		OC-SS-448-0.0/1.0-XXX		OC-SS-452-0.0/1.0-XXX	
				06/08/11		06/08/11		06/08/11		06/08/11	
				FS		FD		FS		FS	
				360-34316-1		360-34316-1		360-34316-1		360-34316-1	
Frac	Method	Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
N	E300	Chloride	mg/Kg	21	U	20	U	22	U	21	U
N	E300	Nitrate as N	mg/Kg	5.2	U	5.1	U	5.5	U	5.2	U
N	E300	Nitrite as N	mg/Kg	1	U	1	U	1.1	U	1	U
N	LACH_107_06_1_B	Nitrogen, as Ammonia	mg/Kg	18		33		42		35	
N	E300	Sulfate	mg/Kg	300		12000	J	6700	J	6600	
N	E160.3	Percent Moisture	percent	4.8		4.6		13		3.7	
N	E160.3	Percent Solids	percent	95		95		87		96	

Notes:

N = normal

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

J = value is estimated

mg/Kg = milligram per kilogram

Prepared by / Date: KJC 09/09/11

Checked by / Date: MJW 09/09/11

**Table 2.5**  
**Final Results Summary - General Chemistry**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name	RINSE BLANK
				Field Sample ID	OC-EBK-019
				Field Sample Date	06/08/11
				QC Code	EB
				Lab Sample Delivery Group	360-34315-1
Frac	Method	Analyte	Units	Result	Qual
N	E300	Bromide	mg/L	0.1	U
N	E300	Chloride	mg/L	1	U
N	E300	Nitrate as N	mg/L	0.05	U
N	E300	Nitrite as N	mg/L	0.01	U
N	LACH_107_06_1_B	Nitrogen, as Ammonia	mg/L	2	U
N	E300	Sulfate	mg/L	0.13	

Notes:

N = normal

EB = Equipment Rinsate Blank

U = not detected, value is the detection limit

mg/L = milligram per liter

Prepared by / Date: KJC 08/26/11

Checked by / Date: MJW 09/09/11

**Table 2.6  
Final Results Summary - Formaldehyde  
June 2011 Surface Water Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

				Loc Name		SS-448	SS-448
				Field Sample ID		OC-SS-448-0.0/1.0-DUP	OC-SS-448-0.0/1.0-XXX
				Field Sample Date		06/08/11	06/08/11
				QC Code		FD	FS
				Lab Sample Delivery Group		360-34316-1	360-34316-1
Frac	Method	Analyte	Units	Result	Qual	Result	Qual
N	SW8315	Acetaldehyde	ug/Kg	210	UJ	230	UJ
N	SW8315	Formaldehyde	ug/Kg	300	J	350	J

Notes:

N = normal

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

ug/Kg = microgram per kilogram

Prepared by / Date: KJC 09/09/11

Checked by / Date: WDC 09/09/11

**Table 2.6  
Final Results Summary - Formaldehyde  
June 2011 Surface Water Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

				<b>Loc Name</b>	RINSE BLANK
				<b>Field Sample ID</b>	OC-EBK-019
				<b>Field Sample Date</b>	06/08/11
				<b>QC Code</b>	EB
				<b>Lab Sample Delivery Group</b>	360-34315-1
<b>Frac</b>	<b>Method</b>	<b>Analyte</b>	<b>Units</b>	<b>Result</b>	<b>Qual</b>
N	SW8315	Acetaldehyde	ug/L	30	U
N	SW8315	Formaldehyde	ug/L	30	U

Notes:

N = normal

EB = equipment rinsate blank

U = not detected, value is the detection limit

ug/L = microgram per liter

Prepared by / Date: KJC 08/31/11

Checked by / Date: WDC 09/09/11

**Table 2.7**  
**Final Results Summary - Phthalic Acid/Phthalic Anhydride**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

			Loc Name	SS-448	SS-448
			Field Sample ID	OC-SS-448-0.0/1.0-DUP	OC-SS-448-0.0/1.0-XXX
			Field Sample Date	06/08/11	06/08/11
			QC Code	FD	FS
			Lab Sample Delivery Group	360-34316-1	360-34316-1
Frac	Method	Analyte	Units	Result	Qual
N	LC65	Phthalic Acid/Phthalic anhydride	ug/Kg	100 U	110 U

Notes:

N = normal

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

ug/Kg = microgram per kilogram

Prepared by / Date: KJC 09/09/11

Checked by / Date: TLC 09/09/11

**Table 2.7**  
**Final Results Summary - Phthalic Acid/Phthalic Anhydride**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				<b>Loc Name</b>	RINSE BLANK
				<b>Field Sample ID</b>	OC-EBK-019
				<b>Field Sample Date</b>	06/08/11
				<b>QC Code</b>	EB
				<b>Lab Sample Delivery Group</b>	360-34315-1
<b>Frac</b>	<b>Method</b>	<b>Analyte</b>	<b>Units</b>	<b>Result</b>	<b>Qual</b>
N	LC65	Phthalic Acid/Phthalic anhydride	ug/L	10	U

Notes:

N = normal

EB = Equipment Rinsate Blank

U = not detected, value is the detection limit

ug/L = microgram per liter

Prepared by / Date: KJC 09/02/11

Checked by / Date: TLC 09/02/11

**Table 2.8**  
**Final Results Summary - Hydrazine**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name		SS-448		SS-448	
				Field Sample ID		OC-SS-448-0.0/1.0-DUP		OC-SS-448-0.0/1.0-XXX	
				Field Sample Date		06/08/11		06/08/11	
				QC Code		FD		FS	
				Lab Sample Delivery Group		1250628		1250628	
Frac	Method	Analyte	Units	Result	Qual	Result	Qual	Result	Qual
N	SW8315A MOD	Hydrazine	ng/g	2.5		1.7	J		
N	SW8315A MOD	Monomethylhydrazine (MMH)	ng/g	5.3	U	5.3	U		
N	SW8315A MOD	UDMH	ng/g	5.3	U	5.3	U		

Notes:

N = normal

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

J = value is estimated

ng/h = nanogram per gram

Prepared by / Date: KJC 09/09/11

Checked by / Date: WDC 09/09/11

**Table 2.8**  
**Final Results Summary - Hydrazine**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				<b>Loc Name</b>	RINSE BLANK
				<b>Field Sample ID</b>	OC-EBK-019
				<b>Field Sample Date</b>	06/08/11
				<b>QC Code</b>	EB
				<b>Lab Sample Delivery Group</b>	1250627
<b>Frac</b>	<b>Method</b>	<b>Analyte</b>	<b>Units</b>	<b>Result</b>	<b>Qual</b>
N	SW8315A MOD	Hydrazine	ug/l	0.1 U	
N	SW8315A MOD	Monomethylhydrazine (MMH)	ug/l	0.5 U	
N	SW8315A MOD	UDMH	ug/l	0.5 U	

Notes:

N = normal

EB = equipment rinsate blank

U = not detected, value is the detection limit

ug/l = microgram per liter

Prepared by / Date: KJC 08/22/11

Checked by / Date: WDC 09/09/11

**Table 2.9  
Final Results Summary - DMF  
June 2011 Soil Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

				SS-448		SS-448	
				OC-SS-448-0.0/1.0-DUP		OC-SS-448-0.0/1.0-XXX	
				06/08/11		06/08/11	
				FD		FS	
				WIL-22		WIL-22	
<b>Frac</b>	<b>Method</b>	<b>Analyte</b>	<b>Units</b>	<b>Result</b>	<b>Qual</b>	<b>Result</b>	<b>Qual</b>
T	SW8033M	Dimethylformamide	mg/Kg	0.21	UJ	0.2	UJ

Notes:

T = total

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

J = value is estimated

mg/Kg = milligram per kilogram

Prepared by / Date: KJC 09/09/11

Checked by / Date: MJW 09/09/11

**Table 2.9**  
**Final Results Summary - DMF**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

		<b>Loc Name</b>	RINSE BLANK
		<b>Field Sample ID</b>	OC-EBK-019
		<b>Field Sample Date</b>	06/08/11
		<b>QC Code</b>	EB
		<b>Lab Sample Delivery Group</b>	WIL-23
<b>Frac</b>	<b>Method</b>	<b>Analyte</b>	<b>Units</b>
T	SW8033M	Dimethylformamide	mg/L
		<b>Result</b>	<b>Qual</b>
		0.02	UJ

Notes:

T = total

EB = equipment rinsate blank

U = not detected, value is the detection limit

J = value is estimated

mg/L = milligram per liter

Prepared by / Date: KJC 09/09/11

Checked by / Date: MJW 09/09/11

**Table 3.2**  
**Data Validation Action Summary - VOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

Sample Delivery Group	Lab Sample ID	Analysis Method	Field Sample ID	Parameter Name	Lab Result	Lab Qualifier	Validated Result	Validation Qualifier	Validation Reason Code	Result Units
360-34316-1	360-34316-1	SW8260C	OC-SS-452-0.0/1.0-XXX	1,2,4-Trimethylbenzene	2.7	U *	2.7	UJ	CCV%D	ug/Kg
360-34316-1	360-34316-7	SW8260C	OC-SS-433-0.0/1.0-XXX	1,2,4-Trimethylbenzene	3.9	U *	3.9	UJ	CCV%D	ug/Kg
360-34316-1	360-34316-8	SW8260C	OC-SS-448-0.0/1.0-DUP	1,2,4-Trimethylbenzene	3.1	U *	3.1	UJ	CCV%D	ug/Kg
360-34316-1	360-34316-9	SW8260C	OC-SS-448-0.0/1.0-XXX	1,2,4-Trimethylbenzene	2.8	U *	2.8	UJ	CCV%D	ug/Kg
360-34316-1	360-34316-1	SW8260C	OC-SS-452-0.0/1.0-XXX	Tetrahydrofuran	27	U	27	UJ	ICVRRF	ug/Kg
360-34316-1	360-34316-7	SW8260C	OC-SS-433-0.0/1.0-XXX	Tetrahydrofuran	39	U	39	UJ	ICVRRF	ug/Kg
360-34316-1	360-34316-8	SW8260C	OC-SS-448-0.0/1.0-DUP	Tetrahydrofuran	31	U	31	UJ	ICVRRF	ug/Kg
360-34316-1	360-34316-9	SW8260C	OC-SS-448-0.0/1.0-XXX	Tetrahydrofuran	28	U	28	UJ	ICVRRF	ug/Kg
360-34316-1	360-34316-1	SW8260C	OC-SS-452-0.0/1.0-XXX	1,4-Dioxane	270	U	270	UJ	ICVRRF,CCVRRF	ug/Kg
360-34316-1	360-34316-7	SW8260C	OC-SS-433-0.0/1.0-XXX	1,4-Dioxane	390	U	390	UJ	ICVRRF,CCVRRF	ug/Kg
360-34316-1	360-34316-8	SW8260C	OC-SS-448-0.0/1.0-DUP	1,4-Dioxane	310	U	310	UJ	ICVRRF,CCVRRF	ug/Kg
360-34316-1	360-34316-9	SW8260C	OC-SS-448-0.0/1.0-XXX	1,4-Dioxane	280	U	280	UJ	ICVRRF,CCVRRF	ug/Kg
360-34316-1	360-34316-8	SW8260C	OC-SS-448-0.0/1.0-DUP	1,2,3-Trichlorobenzene	3.1	U	3.1	UJ	MS-L	ug/Kg
360-34316-1	360-34316-9	SW8260C	OC-SS-448-0.0/1.0-XXX	1,2,3-Trichlorobenzene	2.8	U	2.8	UJ	MS-L	ug/Kg
360-34316-1	360-34316-8	SW8260C	OC-SS-448-0.0/1.0-DUP	1,2,4-Trichlorobenzene	3.1	U	3.1	UJ	MS-L	ug/Kg
360-34316-1	360-34316-9	SW8260C	OC-SS-448-0.0/1.0-XXX	1,2,4-Trichlorobenzene	2.8	U	2.8	UJ	MS-L	ug/Kg
360-34316-1	360-34316-8	SW8260C	OC-SS-448-0.0/1.0-DUP	1,3-Dichlorobenzene	3.1	U	3.1	UJ	MS-L	ug/Kg
360-34316-1	360-34316-9	SW8260C	OC-SS-448-0.0/1.0-XXX	1,3-Dichlorobenzene	2.8	U	2.8	UJ	MS-L	ug/Kg
360-34316-1	360-34316-8	SW8260C	OC-SS-448-0.0/1.0-DUP	Hexachlorobutadiene	3.1	U	3.1	UJ	MS-L	ug/Kg
360-34316-1	360-34316-9	SW8260C	OC-SS-448-0.0/1.0-XXX	Hexachlorobutadiene	2.8	U	2.8	UJ	MS-L	ug/Kg
360-34316-1	360-34316-8	SW8260C	OC-SS-448-0.0/1.0-DUP	Naphthalene	31	U	31	UJ	MS-L	ug/Kg
360-34316-1	360-34316-9	SW8260C	OC-SS-448-0.0/1.0-XXX	Naphthalene	28	U	28	UJ	MS-L	ug/Kg

Units:

ug/Kg = microgram per kilogram

Validation Qualifier:

U = not detected, value is the detection limit  
J = value is estimated

Validation Reason Codes:

CCV%D = Continuing calibration %D  
CCVRRF = Continuing calibration RRF  
ICVRRF = Initial calibration RRF  
MS-H = MS and/or MSD recovery high

Prepared by / Date: KJC 09/09/11

Checked by / Date: BBL 09/09/11

**Table 3.3**  
**Data Validation Action Summary - SVOCs**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

Sample Delivery Group	Lab Sample ID	Analysis Method	Field Sample ID	Parameter Name	Lab Result	Lab Qualifier	Validated Result	Validation Qualifier	Validation Reason Code	Result Units
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	Benzoic Acid	230	J B	230	JEB	BL2	ug/Kg
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	Benzoic Acid	160	J B	160	JEB	BL2	ug/Kg
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	Benzoic Acid	190	J B	190	JEB	BL2	ug/Kg
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	Benzoic Acid	200	J B	200	JEB	BL2	ug/Kg
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	2,4-Dinitrophenol	130	U	130	UJ	CCV%D	ug/Kg
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	2,4-Dinitrophenol	130	U	130	UJ	CCV%D	ug/Kg
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	4,6-Dinitro-2-methylphenol	650	U	650	UJ	CCV%D	ug/Kg
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	4,6-Dinitro-2-methylphenol	640	U	640	UJ	CCV%D	ug/Kg
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	Benzo(ghi)perylene	660		660	J	CCV%D	ug/Kg
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	Benzo(ghi)perylene	91	J	91	J	CCV%D	ug/Kg
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	Benzo(b)fluoranthene	390		390	J	MS-H	ug/Kg
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	Benzo(b)fluoranthene	410		410	J	MS-H	ug/Kg
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	Benzo(ghi)perylene	290		290	J	MS-H	ug/Kg
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	Benzo(ghi)perylene	310		310	J	MS-H	ug/Kg
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	Indeno(1,2,3-cd)pyrene	270		270	J	MS-H	ug/Kg
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	Indeno(1,2,3-cd)pyrene	290		290	J	MS-H	ug/Kg
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	3,3'-Dichlorobenzidine	260	U		R	MS-L	ug/Kg
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	3,3'-Dichlorobenzidine	280	U		R	MS-L	ug/Kg
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	4-Chloroaniline	260	U	260	UJ	MS-L	ug/Kg
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	4-Chloroaniline	280	U	280	UJ	MS-L	ug/Kg
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	Aniline	130	U		R	MS-L	ug/Kg
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	Aniline	140	U		R	MS-L	ug/Kg
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	Hexachlorocyclopentadiene	260	U		R	MS-L	ug/Kg
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	Hexachlorocyclopentadiene	280	U		R	MS-L	ug/Kg

Units:

ug/Kg = microgram per kilogram

Validation Qualifier:

U = not detected, value is the detection limit

J = value is estimated

EB = compound detected in the associated equipment rinsate blank

R = value is rejected

Validation Reason Codes:

BL2 = Field QC Blank Qualifier

CCV%D = Continuing calibration %D

MS-H = MS and/or MSD recovery high

MS-L = MS and/or MSD recovery low

Prepared by / Date: KJC 09/09/11

Checked by / Date: WDC 09/12/11

**Table 3.4**  
**Data Validation Action Summary - Metals**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

Sample Delivery Group	Lab Sample ID	Analysis Method	Fraction	Field Sample ID	Parameter Name	Lab Result	Lab Qualifier	Validated Result	Validation Qualifier	Validation Reason Code	Result Units
360-34316-1	360-34316-7	SW6010	T	OC-SS-433-0.0/1.0-XXX	Sodium	56	J B	110	U	BL1	mg/Kg
360-34316-1	360-34316-8	SW6010	T	OC-SS-448-0.0/1.0-DUP	Sodium	82	J B	120	U	BL1	mg/Kg
360-34316-1	360-34316-9	SW6010	T	OC-SS-448-0.0/1.0-XXX	Sodium	73	J B	120	U	BL1	mg/Kg
360-34316-1	360-34316-1	SW6010	T	OC-SS-452-0.0/1.0-XXX	Sodium	59	J B	110	U	BL1	mg/Kg
360-34316-1	360-34316-7	SW6010	T	OC-SS-433-0.0/1.0-XXX	Tin	2.8	J B	5.6	U	BL1	mg/Kg
360-34316-1	360-34316-8	SW6010	T	OC-SS-448-0.0/1.0-DUP	Tin	2.2	J B	6.1	U	BL1	mg/Kg
360-34316-1	360-34316-9	SW6010	T	OC-SS-448-0.0/1.0-XXX	Tin	1.9	J B	6.1	U	BL1	mg/Kg
360-34316-1	360-34316-1	SW6010	T	OC-SS-452-0.0/1.0-XXX	Tin	1.2	J B	5.5	U	BL1	mg/Kg
360-34316-1	360-34316-7	SW6010	T	OC-SS-433-0.0/1.0-XXX	Antimony	0.56	U	0.56	UJ	MS-L, IFCS-L	mg/Kg
360-34316-1	360-34316-8	SW6010	T	OC-SS-448-0.0/1.0-DUP	Antimony	0.61	U	0.61	UJ	MS-L, IFCS-L	mg/Kg
360-34316-1	360-34316-9	SW6010	T	OC-SS-448-0.0/1.0-XXX	Antimony	0.61	U	0.61	UJ	MS-L, IFCS-L	mg/Kg
360-34316-1	360-34316-1	SW6010	T	OC-SS-452-0.0/1.0-XXX	Antimony	0.55	U	0.55	UJ	MS-L, IFCS-L	mg/Kg

Units:

mg/Kg = milligram per kilogram

Validation Reason Codes:

BL1 = Method Blank Qualifier

IFCS-L = Interference Check Sample indicates possible low bias

MS-L = MS and/or MSD recovery low

Prepared by / Date: KJC 09/09/11

Checked by / Date: TLC 09/09/11

Validation Qualifier:

U = not detected, value is the detection limit

J = value is estimated

Fraction

T = Total (unfiltered)

**Table 3.5**  
**Data Validation Action Summary - General Chemistry**  
**June 2011 Soil Sampling**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

Sample Delivery Group	Lab Sample ID	Analysis Method	Field Sample ID	Parameter Name	Lab Result	Lab Qualifier	Validated Result	Validation Qualifier	Validation Reason Code	Result Units
360-34316-1	360-34316-8	E300	OC-SS-448-0.0/1.0-DUP	Sulfate	12000		12000	J	FD	mg/Kg
360-34316-1	360-34316-9	E300	OC-SS-448-0.0/1.0-XXX	Sulfate	6700		6700	J	FD	mg/Kg

Units:  
mg/Kg = milligram per kilogram

Validation Reason Codes:  
FD = Field Duplicate limit exceeded.

Prepared by / Date: KJC 09/09/11  
Checked by / Date: MJW 09/09/11

Validation Qualifier:  
J = value is estimated

**Table 3.6  
Data Validation Action Summary - Formaldehyde  
June 2011 Soil Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

Sample Delivery Group	Lab Sample ID	Analysis Method	Field Sample ID	Parameter Name	Lab Result	Lab Qualifier	Validated Result	Validation Qualifier	Validation Reason Code	Result Units
360-34316-1	360-34316-8	SW8315	OC-SS-448-0.0/1.0-DUP	Acetaldehyde	210	U	210	UJ	HT, MS-L	ug/Kg
360-34316-1	360-34316-8	SW8315	OC-SS-448-0.0/1.0-DUP	Formaldehyde	300		300	J	HT, MS-L	ug/Kg
360-34316-1	360-34316-9	SW8315	OC-SS-448-0.0/1.0-XXX	Acetaldehyde	230	U	230	UJ	HT, MS-L	ug/Kg
360-34316-1	360-34316-9	SW8315	OC-SS-448-0.0/1.0-XXX	Formaldehyde	350		350	J	HT, MS-L	ug/Kg

Units:

ug/Kg = microgram per kilogram

Validation Reason Codes:

HT = Holding time for prep or analysis exceeded

MS-L = MS and/or MSD recovery low

Validation Qualifier:

U = not detected, value is the detection limit

J = value is estimated

Prepared by / Date: KJC 09/09/11

Checked by / Date: WDC 09/09/11

**Table 3.9  
Data Validation Action Summary - DMF  
June 2011 Soil Sampling  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

Sample Delivery Group	Lab Sample ID	Analysis Method	Field Sample ID	Parameter Name	Lab Result	Lab Qualifier	Validated Result	Validation Qualifier	Validation Reason Code	Result Units
WIL-22	SE3249-1	SW8033M	OC-SS-448-0.0/1.0-DUP	Dimethylformamide	0.21	U	0.21	UJ	MS-L	mg/Kg
WIL-22	SE3249-2	SW8033M	OC-SS-448-0.0/1.0-XXX	Dimethylformamide	0.2	U	0.2	UJ	MS-L	mg/Kg

Units:

mg/Kg = milligram per kilogram

Validation Reason Codes:

MS-L = MS and/or MSD recovery low

Validation Qualifier:

U = not detected, value is the detection limit

J = value is estimated

Prepared by / Date: KJC 09/09/11

Checked by / Date: MJW 09/09/11

**Table 4-1  
Tentatively Identified SVOC Compounds  
June 2011 OU1 Soil Program  
Olin Chemical Superfund Site  
Wilmington, Massachusetts**

SDG	Lab Sample ID	Method	Field Sample ID	Sample Date	CAS #	Analyte	RT	Final Result	Q	Units	DF	Analysis Date	Analysis Time
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	TIC02	Unknown	12.68	150	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	TIC03	Unknown	13.14	230	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	629-96-9	1-Eicosanol	13.33	140	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	2885-0-9	1-Octadecanethiol	13.95	350	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	71502-22-2	9-Hexacosene	14.49	1200	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	26603-23-6	p,p'-Diocetyl-diphenylamine	14.68	5900	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	629-92-5	Nonadecane	14.98	260	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	83-47-6	.gamma.-Sitosterol	15.61	340	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	TIC04	Unknown	16.43	120	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-1	SW8270	OC-SS-452-0.0/1.0-XXX	08-Jun-11	TIC01	Unknown	3.12	3400	JN	ug/kg	5	22-Jun-11	9:07:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	TIC02	Unknown	11.38	430	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	57-10-3	n-Hexadecanoic acid	11.4	490	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	84-65-1	9,10-Anthracenedione	11.58	430	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	5737-13-3	Cyclopenta(def)phenanthrene	11.89	310	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	239-35-0	Benzo[b]naphtho[2,1-d]thiophene	13.12	370	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	1740-19-8	1-Phenanthrenecarboxylic acid, 1,2,3,4,4	13.22	480	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	TIC03	Unknown	14.43	340	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	2885-0-9	1-Octadecanethiol	14.49	630	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	192-97-2	Benzo[e]pyrene	14.52	790	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-7	SW8270	OC-SS-433-0.0/1.0-XXX	08-Jun-11	TIC01	Unknown	3.13	3100	JN	ug/kg	5	22-Jun-11	10:36:00 PM
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	08-Jun-11	TIC02	Unknown	10.76	120	JN	ug/kg	5	21-Jun-11	3:59:00 AM
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	08-Jun-11	82-5-3	7H-Benz[de]anthracen-7-one	13.24	110	JN	ug/kg	5	21-Jun-11	3:59:00 AM
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	08-Jun-11	TIC03	Unknown	13.55	150	JN	ug/kg	5	21-Jun-11	3:59:00 AM
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	08-Jun-11	2885-0-9	1-Octadecanethiol	14.15	240	JN	ug/kg	5	21-Jun-11	3:59:00 AM
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	08-Jun-11	629-78-7	Heptadecane	14.68	720	JN	ug/kg	5	21-Jun-11	3:59:00 AM
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	08-Jun-11	198-55-0	Perylene	14.74	280	JN	ug/kg	5	21-Jun-11	3:59:00 AM
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	08-Jun-11	TIC04	Unknown	14.88	340	JN	ug/kg	5	21-Jun-11	3:59:00 AM
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	08-Jun-11	112-95-8	Eicosane	15.19	220	JN	ug/kg	5	21-Jun-11	3:59:00 AM
360-34316-1	360-34316-8	SW8270	OC-SS-448-0.0/1.0-DUP	08-Jun-11	TIC01	Unknown	3.62	3600	JN	ug/kg	5	21-Jun-11	3:59:00 AM
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	08-Jun-11	TIC02	Unknown	13.24	120	JN	ug/kg	5	21-Jun-11	4:29:00 AM
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	08-Jun-11	1000130-97-9	E-15-Heptadecenal	13.54	150	JN	ug/kg	5	21-Jun-11	4:29:00 AM
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	08-Jun-11	7/1/3452	1-Eicosene	14.15	240	JN	ug/kg	5	21-Jun-11	4:29:00 AM
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	08-Jun-11	71502-22-2	9-Hexacosene	14.69	720	JN	ug/kg	5	21-Jun-11	4:29:00 AM
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	08-Jun-11	198-55-0	Perylene	14.74	250	JN	ug/kg	5	21-Jun-11	4:29:00 AM
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	08-Jun-11	TIC03	Unknown	14.89	480	JN	ug/kg	5	21-Jun-11	4:29:00 AM
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	08-Jun-11	593-45-3	Octadecane	15.19	270	JN	ug/kg	5	21-Jun-11	4:29:00 AM
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	08-Jun-11	TIC04	Unknown	15.85	180	JN	ug/kg	5	21-Jun-11	4:29:00 AM
360-34316-1	360-34316-9	SW8270	OC-SS-448-0.0/1.0-XXX	08-Jun-11	TIC01	Unknown	3.62	3900	JN	ug/kg	5	21-Jun-11	4:29:00 AM

ug/kg = microgram per kilogram  
J = value is estimated  
N = presumptively present

Prepared by / Date: KJC 07/13/11  
Checked by / Date: WDC 09/09/11

Olin Corporation  
Olin Chemical Superfund Site – 51 Eames Street, Wilmington, MA  
Data Validation Report 2011 RI/FS, Off Property Soils, Operable Unit 1, June 2011 Sampling Event

**ATTACHMENT A**  
**USEPA SCORE SHEETS**

# PES SCORING EVALUATION REPORT

PES VS0535

Rev: 1 EPA Sample No.: 360-34316-6

Report Date: 09/08/2011

Page 1 of 1

Lab Name: Testamerica Westfield

Contract: 360-34316-1

SDG No.: 360-34316-1

Lab File ID: V52920.D

Sample Wt./Vol. (g/mL): 5 g

Purge Volume (mL): NA

Length (m): NA

Dilution Factor: 1

Case No.: 360-34316-1

Matrix: Soil

Date Received: 06/08/2011

Level: Low

GC Column: RTX-VMS

Soil Extract. Vol. (uL): NA

Units: ug/Kg

Lab Code: TESWES

SAS/Client No.: NA

Lab Sample ID: 360-34316-6

Date Analyzed: 06/20/2011

% Moisture (not dec.): 0.0

ID (mm): 0.25

Soil Aliquot Vol. (uL): NA

Analysis Method: 8260C

Scoring Method: SOM01.1

Comments:

CAS No.	Analyte	Laboratory Results		PES Evaluation	
		Concentration	Q		
75-01-4	Vinyl Chloride	53		PASS	Within Limits
74-83-9	Bromomethane	41		PASS	Within Limits
75-00-3	Chloroethane	30		PASS	Within Limits
67-64-1	Acetone	600		PASS	Within Limits
75-15-0	Carbon Disulfide	78		FAIL	Action High
75-09-2	Methylene Chloride	48		PASS	Within Limits
156-60-5	trans-1,2-Dichloroethene	53		FAIL	Action High
1634-04-4	Methyl tert-Butyl Ether	79		PASS	Within Limits
67-66-3	Chloroform	35		PASS	Within Limits
71-55-6	1,1,1-Trichloroethane	38		FAIL	Action High
110-82-7	Cyclohexane	140		PASS	Within Limits
56-23-5	Carbon Tetrachloride	21		PASS	Within Limits
71-43-2	Benzene	67		PASS	Warning High
107-06-2	1,2-Dichloroethane	54		PASS	Warning High
79-01-6	Trichloroethene	56		PASS	Warning High
108-87-2	Methylcyclohexane	110		PASS	Warning High
78-87-5	1,2-Dichloropropane	100		PASS	Warning High
108-88-3	Toluene	52		PASS	Warning High
79-00-5	1,1,2-Trichloroethane	59		PASS	Within Limits
127-18-4	Tetrachloroethene	68		PASS	Within Limits
124-48-1	Dibromochloromethane	50		PASS	Within Limits
100-41-4	Ethylbenzene	52		PASS	Within Limits
100-42-5	Styrene	52		PASS	Within Limits
98-82-8	Isopropylbenzene	62		PASS	Within Limits
541-73-1	1,3-Dichlorobenzene	87		PASS	Within Limits
96-12-8	1,2-Dibromo-3-chloropropane	17	J	PASS	Within Limits
120-82-1	1,2,4-Trichlorobenzene	100		PASS	Within Limits
123-91-1	1,4-Dioxane	320		PASS	Within Limits
594-20-7	2,2-Dichloropropane	75		PASS	TIC Found
****	END Main Analytes	*****	****	****	*****
109-87-5	Methane, dimethoxy-	12	JN	N.E.	Non-spiked TIC
****	END All Analytes	*****	****	****	*****



# PES SCORING EVALUATION REPORT

PES SS1507

Rev: 1 EPA Sample No.: 360-34316-4

Report Date: 09/09/2011

Page 1 of 2

Lab Name: Testamerica Westfield	Case No.: 360-34316-1	Lab Code: TESWES
Contract: 360-34316-1	Matrix: Soil	SAS/Client No.: NA
SDG No.: 360-34316-1	Date Received: 06/08/2011	Lab Sample ID: 360-34316-4
Lab File ID: J2963.D	Sample Wt./Vol. (g/mL): 30.12 g	Date Extracted: 06/17/2011
Date Analyzed: 06/21/2011	Decanted: N/A	Level: Low
% Moisture: 0.0	GPC Cleanup: No	Conc. Extract Vol. (uL): 1.0 mL
Injection Vol. (uL): 1	Extraction Type: N/A	pH: NA
Dilution Factor: 1		Units: ug/Kg

Analysis Method: 8270D  
 Scoring Method: SOM01.1  
 Comments:

CAS No.	Analyte	Laboratory Results		PES Evaluation	
		Concentration	Q		
111-44-4	bis(2-Chloroethyl)ether	0		N.E.	Scorer Request
95-57-8	2-Chlorophenol	140		PASS	Within Limits
108-60-1	2,2'-oxybis(1-Chloropropane)	0		N.E.	Scorer Request
621-64-7	N-Nitroso-di-n-propylamine	0		N.E.	Scorer Request
67-72-1	Hexachloroethane	530		PASS	Within Limits
78-59-1	Isophorone	420		PASS	Within Limits
111-91-1	bis(2-Chloroethoxy)methane	0		N.E.	Scorer Request
120-83-2	2,4-Dichlorophenol	340		PASS	Within Limits
91-20-3	Naphthalene	200		PASS	Within Limits
106-47-8	4-Chloroaniline	140		PASS	Within Limits
105-60-2	Caprolactam	220	B	PASS	Within Limits
77-47-4	Hexachlorocyclopentadiene	0		N.E.	Scorer Request
95-95-4	2,4,5-Trichlorophenol	0		N.E.	Scorer Request
91-58-7	2-Chloronaphthalene	540		PASS	Within Limits
606-20-2	2,6-Dinitrotoluene	0		N.E.	Scorer Request
208-96-8	Acenaphthylene	280		PASS	Within Limits
51-28-5	2,4-Dinitrophenol	120		N.E.	Not Evaluated
132-64-9	Dibenzofuran	250		PASS	Within Limits
121-14-2	2,4-Dinitrotoluene	280		PASS	Within Limits
86-73-7	Fluorene	0		N.E.	Scorer Request
7005-72-3	4-Chlorophenyl-phenylether	370		PASS	Within Limits
95-94-3	1,2,4,5-Tetrachlorobenzene	450		PASS	Within Limits
101-55-3	4-Bromophenyl-phenylether	460		PASS	Within Limits
118-74-1	Hexachlorobenzene	360		PASS	Within Limits
1912-24-9	Atrazine	0	U	N.E.	Not Evaluated
87-86-5	Pentachlorophenol	540		PASS	Within Limits
120-12-7	Anthracene	390		PASS	Within Limits
86-74-8	Carbazole	440		PASS	Within Limits
85-68-7	Butylbenzylphthalate	0		N.E.	Scorer Request
91-94-1	3,3'-Dichlorobenzidine	0	U	N.E.	Scorer Request
56-55-3	Benzo(a)anthracene	590		PASS	Within Limits
117-84-0	Di-n-octylphthalate	0		N.E.	Scorer Request
205-99-2	Benzo(b)fluoranthene	0		N.E.	Scorer Request
207-08-9	Benzo(k)fluoranthene	290		PASS	Within Limits
90-12-0	1-Methylnaphthalene	430		PASS	TIC Found
****	END Main Analytes	*****	****	****	*****
100-01-6	4-Nitroaniline	63	J	PASS	Less Than CRQL





